



# Virtual Reality Studio Orientation

# A look ahead..

- VR Historical Timeline
  - VR / AR Continuum
  - Virtual Reality Technology
  - Augmented Reality Technology
  - 360° Photos & Videos
  - Future Technology
  - Uses of Virtual Reality
  - Use & Safety
  - Hands On Experience
-

# Virtual Reality Historical Timeline

# Virtual Reality in History

1838

The first stereoscope was invented, using twin mirrors to project a single image



1939

The View-Master was introduced at the 1939 New York World's Fair. Made up of seven stereoscopic pictures, viewers could view each film concurrently, reproducing binocular depth perception



1956

Morton Heilig developed the Sensorama Machine. A simulator for one to four people that provides the illusion of reality using a 3-D motion picture with smell, stereo sound, vibrations of the seat, and wind in the hair to create the illusion



1965

inventor, Ivan Sutherland, offered "the Ultimate Display," a head-mounted device that he suggested would serve as a "window into a virtual world."



# Virtual Reality in History

1990

NASA Ames Research Center developed the Virtual Interface Environment Workstation (VIEW) system which combined a head-mounted device with gloves to enable the haptic interaction



2012

Oculus VR, the newly formed company behind Oculus Rift, launches a Kickstarter campaign to fund its development



2014

Samsung releases the Gear VR, a device that has no display itself, but uses the Galaxy Note 4 as a screen and computer



2015

HTC and Valve announce details of their upcoming VR headset, Vive. The first Consumer version was released on April 5th, 2016



# **Understanding VR / AR Continuum**



# Virtual Reality (VR)

"VR is an artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment." - *Merriam Webster Dictionary*



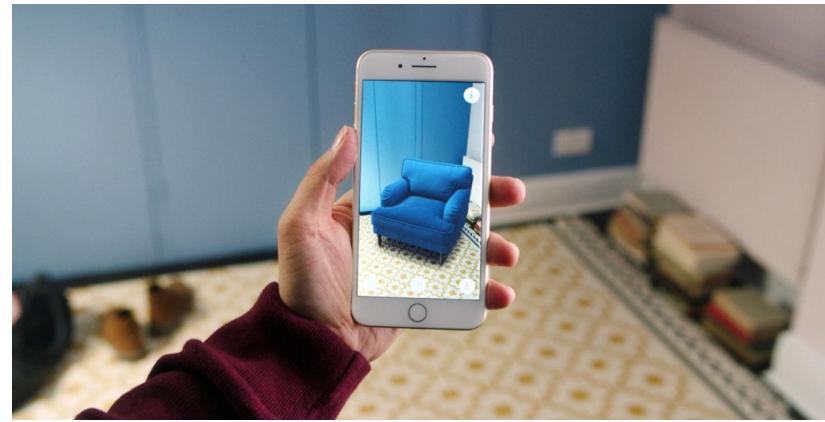
# Augmented Reality (AR)

"AR is an enhanced version of reality created by the use of technology to overlay digital information on an image of something being viewed through a device" - *Merriam Webster Dictionary*



## Virtual Reality

- Experienced in an virtual world
- Generally viewed through a virtual reality headset
- Fully immersive
- In VR, it is difficult to differentiate between what is real and what is not



## Augmented Reality

- Experienced in the real world
- Generally viewed through the screen of a smartphone held in front of the user
- In AR, it is easier to distinguish what is real and what is not

# Virtual Reality Technology

# Smartphone Headsets



Google Cardboard



Samsung Gear VR



Google Daydream

# Desktop and Gaming Headsets



Oculus Rift



HTC Vive



Playstation VR

# VR Controllers

Vive



Rift



Xbox



Playstation



Playstation VR

# Oculus Rift

Rift Kit ~ \$400





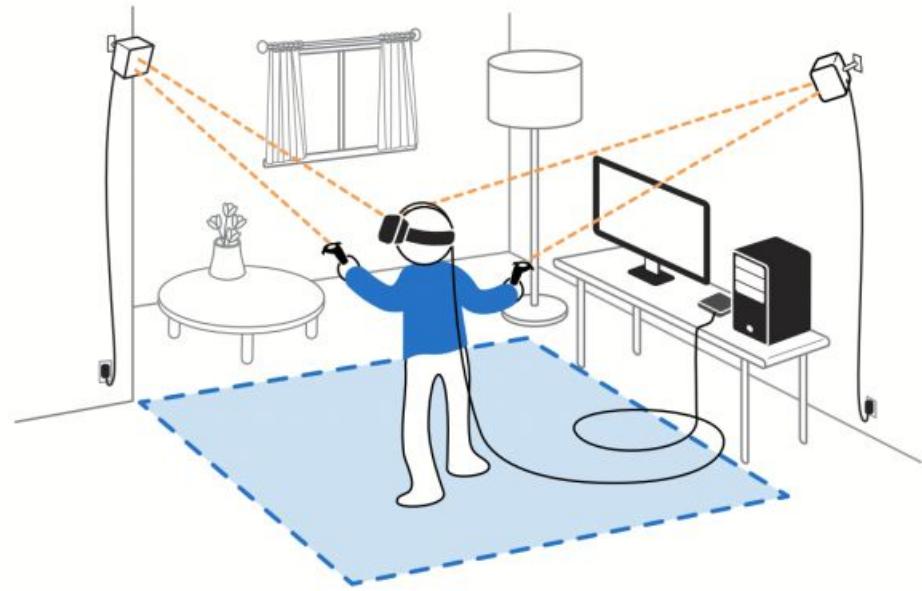
## Rift Tracking

The Rift sensor is a camera that detects infrared beacons on the Rift headset.

# HTC Vive

Vive Kit ~ \$600





# Vive Tracking

The Vive Base Stations emit infrared pulses and X/Y axis sweeps, which are detected by sensors on the headset and controllers.

# Recommended Computer Specs

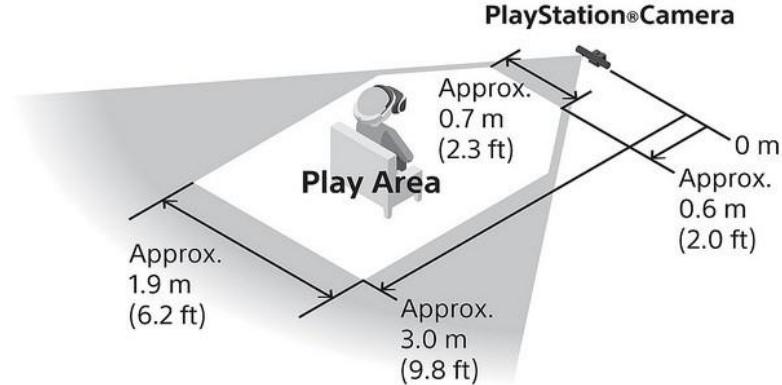
	Oculus Rift	HTC Vive
<b>Graphics Card</b>	NVIDIA GTX 1060 / AMD Radeon RX 480 or greater	NVIDIA GeForce™ GTX 1060 or AMD Radeon™ RX 480, equivalent or better
<b>CPU</b>	Intel i5-4590 / AMD Ryzen 5 1500X or greater	Intel™ Core™ i5-4590 or AMD FX™ 8350, equivalent or better
<b>Memory</b>	8GB+ RAM	4 GB RAM or more
<b>Video Output</b>	Compatible HDMI 1.3 video output	1x HDMI 1.4 port, or DisplayPort 1.2 or newer
<b>USB Ports</b>	3x USB 3.0 ports, plus 1x USB 2.0 port	1x USB 2.0 port or newer
<b>OS</b>	Windows 7 SP1 64 bit or newer	Windows™ 7 SP1, Windows™ 8.1 or later or Windows™ 10



# Playstation VR

PSVR Kit ~ \$600





# PSVR Tracking

Camera sensor tracks lights on headset and controllers.



# Augmented Reality Technology

# AR Mobile Applications

Travel App



1600 App

3D-interactive version of the White House.



# AR Mobile Applications



Merge Cube



[www.mergevr.com](http://www.mergevr.com)

# Head Mounted AR Devices



Microsoft Hololens



Meta

# Head Mounted AR Devices



# 360° Photos & Videos

360° Photo



# 360° Photo & Video Cameras



Nikon KeyMission



Ricoh Theta



Samsung Gear 360



# 360° Formats

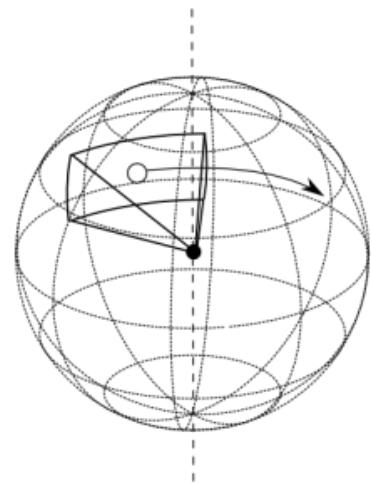
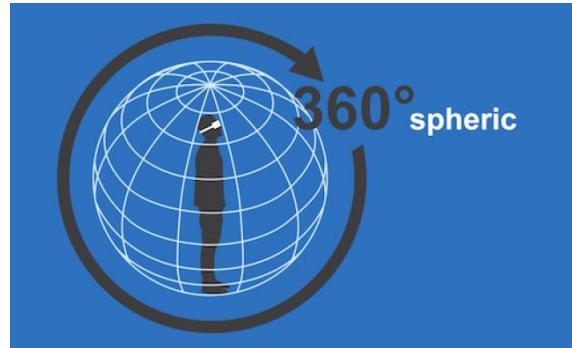
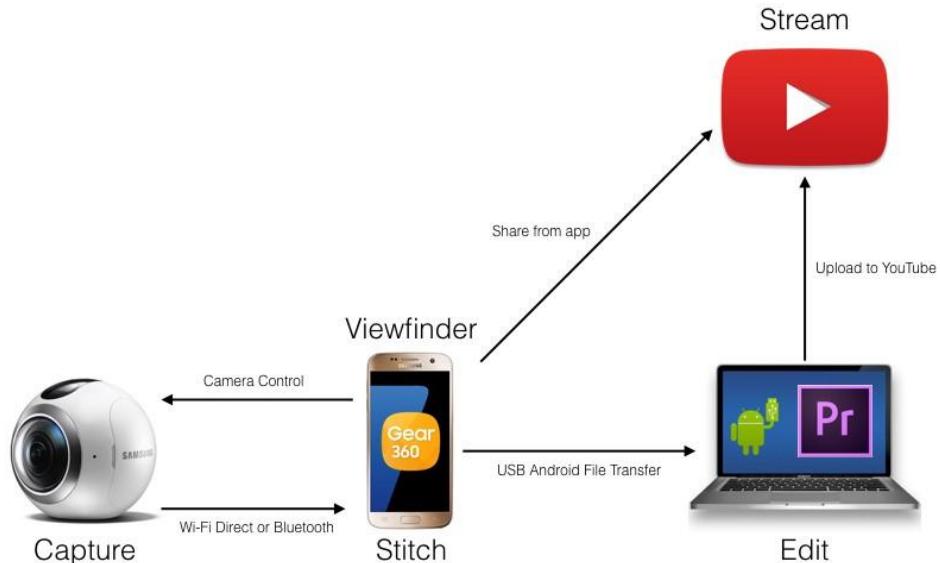


Unstitched



Equirectangular (2:1)

# 360° Workflow



# Future Technology

# Emerging VR Devices



Oculus Go



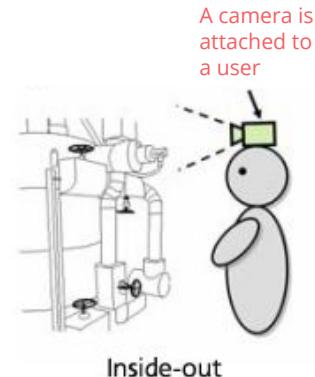
HTC Vive Pro



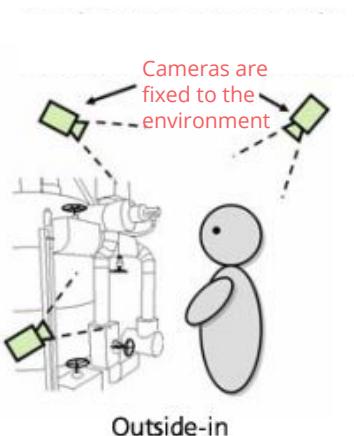
Teslasuit

# Acer Windows Mixed Reality

Headset & Controller ~ \$399



Inside-out



Outside-in

A camera is attached to a user

Cameras are fixed to the environment

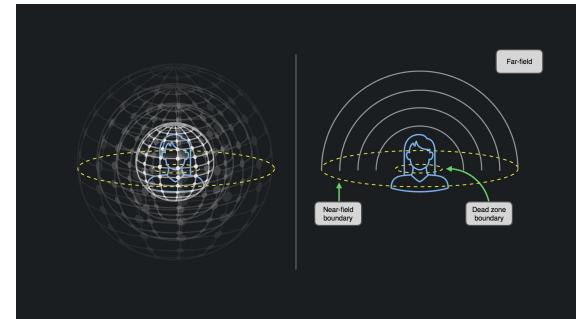
# Emerging VR Affordances



Hand Tracking



Focal Surface Display

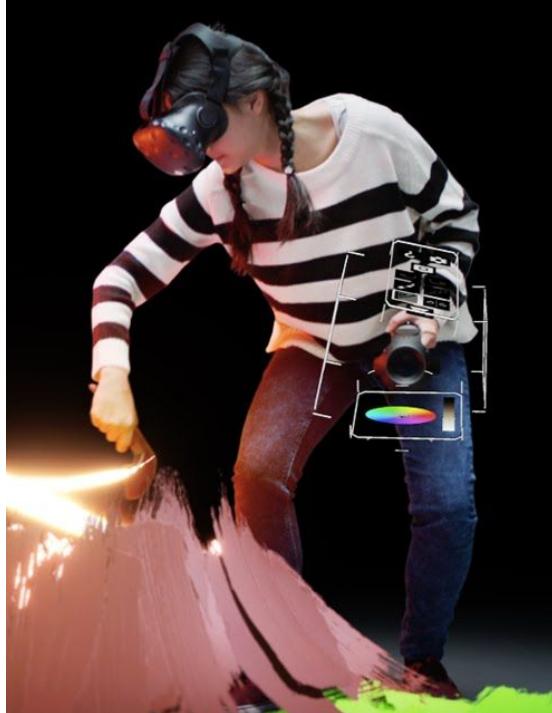


Near-field 3D Audio

# Uses of Virtual Reality

# Create. Paint. Model. Sculpt.

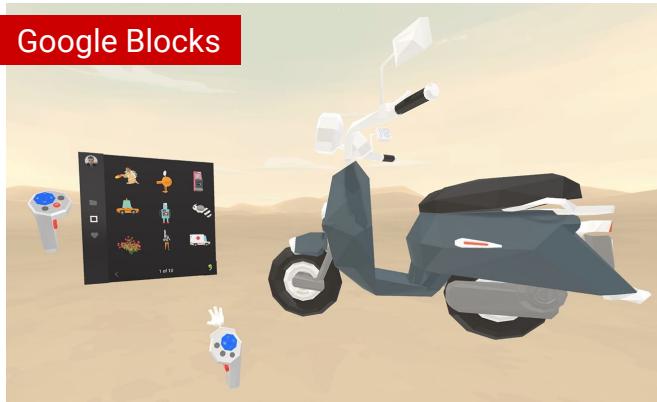
Google Tilt Brush



MakeVR



Google Blocks



# Learn/Research

Google Earth



Google Earth VR



Labster



Universe Sandbox

# Historical/Cultural Preservation



I AM A MAN



Remembering Pearl Harbor

# Physical/Emotional Therapy

Gonio VR



Bravemind



# Stay Connected with Social VR

AltspaceVR



Rec Room



VRChat

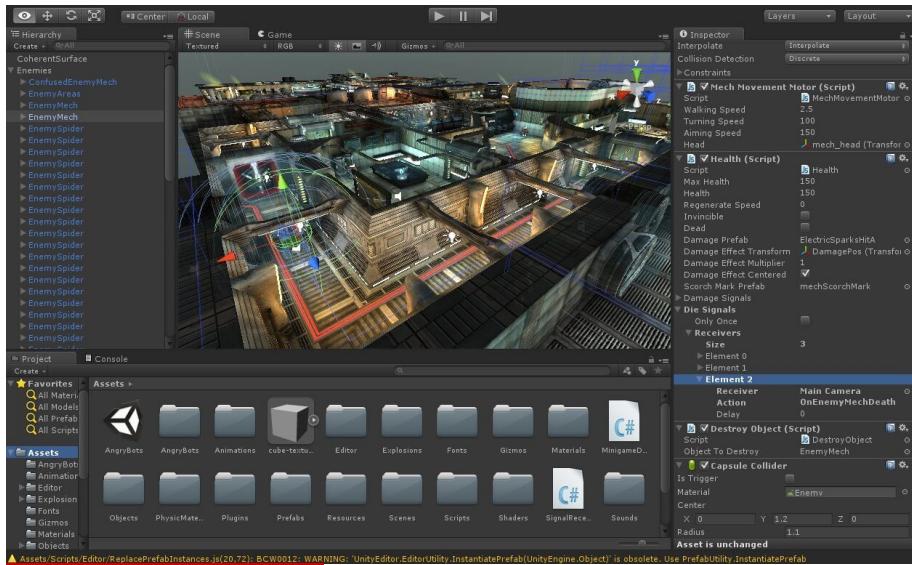


vTime



# Developing VR Experiences

# Game Engines



Unity Game Engine



Unreal Engine

# Developing Workflow



Build environment

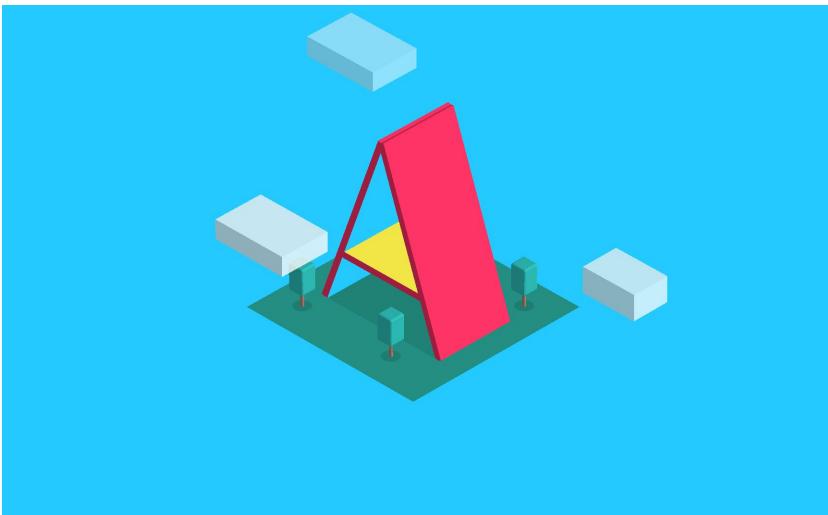
The Unity Editor interface is shown again, but this time focusing on the Assets tab. It displays various game objects under the Enemies category, including Babel, buzzer\_bot, Materials, mech\_bot, and several variants of mine\_bot. Below this, the Solution Explorer shows C# scripts for the Shooter and Done namespaces, including Done\_PlayerController.cs and Done\_Mover.cs. The code editor window shows the Done\_PlayerController.cs script with a yellow highlight on the line "Instantiate(shot, shotSp". A red double-headed arrow connects the two main sections of the slide, indicating the flow from the build environment to the program interactions.

```
public Done_Boundary boundary;
public GameObject shot;
public Transform shotSp;
public float fireRate;
private float nextFire;
void Update()
{
    if (Input.GetButton("Fire1") && Time.time > nextFire)
    {
        nextFire = Time.time + fireRate;
        Instantiate(shot, shotSp);
        shotSp.GetComponent<AudioSource>().volume = 0.2f;
    }
}
void FixedUpdate()
{
    float moveHorizontal = Input.GetAxis("Horizontal");
    float moveVertical = Input.GetAxis("Vertical");
    Vector3 movement = new Vector3(moveHorizontal, 0.0f, moveVertical);
    GetComponent<Rigidbody>().velocity = movement * speed;
    GetComponent<Rigidbody>().position = new Vector3(
}
```

Import Assets

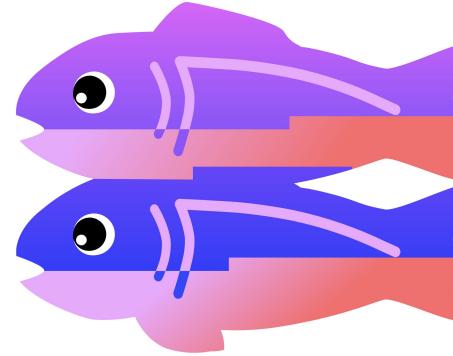
Program Interactions

# WebVR



Aframe

Framework for building VR experiences



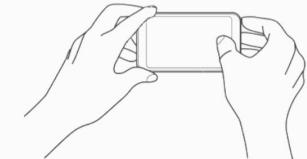
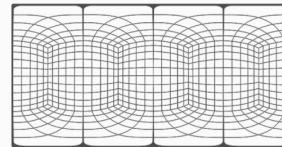
Glitch

C  D E P E N

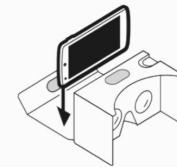
Codepen

Social development platform for building WebVR contents

# VR For Everyone



- Download a grid from our [grids section](#) below.
- Print out the grid onto a letter-sized sheet.



- Go to [the Panoform Tool](#).
- Upload your composition from your phone library.
- Tap on the VR icon after the image loads.
- Insert device into a Cardboard headset for the VR experience!

# Libraries VR Tech Lending



Samsung Gear VR w/ Phone



Oculus Rift VR w/ Touch



Microsoft HoloLens

# Libraries VR Tech Lending



Samsung Gear 360° Camera



Ricoh Theta S 360° Camera



360fly 360° Camera

# Potential Dangers

Sickness

Collision

Tripping

Dropping

# Use & Safety

# Sickness

- Using VR can induce nausea or dizziness, similar to motion sickness.
- Take breaks to prevent sickness and fatigue.



# Collision

- Once the headset is on, you can't see what's around you!
- Take account of your surroundings before putting on the headset.
- Make sure all furniture, backpacks, etc. are outside of the play area, whether or not the area is marked.
- Observers: stay out of play area!
- If you get disoriented, take off the headset and check where you are.



# Tripping

- Be mindful of the headset's cables, they may become tangled or wrapped around your feet.
- Take a break to untangle a twisted, tangled, or wrapped cable.



# Dropping

- Use the controllers' wrist straps to avoid dropping them.



## Mental Effects

- By its nature, virtual reality immerses you in a virtual world. Some of the content you experience in this virtual world is so realistic that your body and mind may react to it as if it were real.
- If the content is frightening, violent, or anxiety provoking, it can cause your body to react physically, including increasing your heart rate and blood pressure. It can also, in some individuals, cause psychological reactions, including anxiety, fear, or even Post Traumatic Stress Disorder (or PTSD).
- If you have a history of any physical or psychological problems that are triggered by experiencing scary, violent or anxiety-inducing images, videos, or games, either avoid viewing any content that could trigger your problems or do not use VR.
- Mental health resources are available at the [NCSU Counseling Center](#)

[https://support.google.com/daydream/answer/7185037?visit\\_id=1-636162973848457164-2214380425&p=safetywarrantyreq&rd=1](https://support.google.com/daydream/answer/7185037?visit_id=1-636162973848457164-2214380425&p=safetywarrantyreq&rd=1)

# Headsets

Fit

Sight

Sound

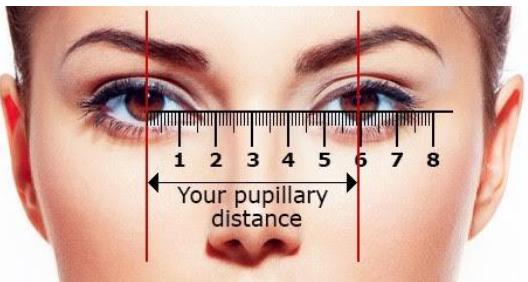
## Fit

- Adjust the headset to get a comfortable fit.
- The Rift has three velcro adjustment points.
- The Vive has a velcro strap on top, and a dial at the back.



# Sight

- Clean lenses with lens cloth.
- Adjust headset properly.
- Adjust controls for interpupillary distance (IPD).



Oculus



Vive



# Glasses

- Glasses may be worn if they fit in the headset.
- Good visual display depends on prescription, specific eye issues, etc.



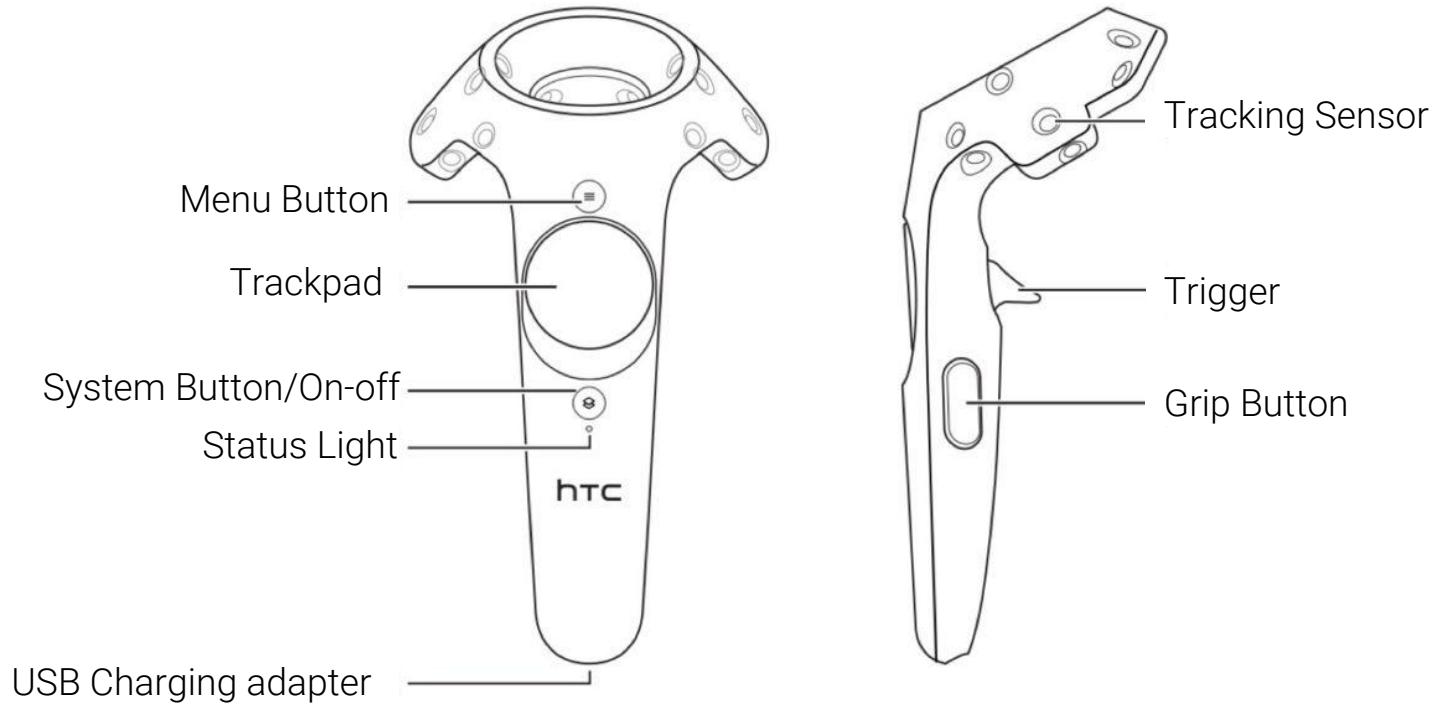
# Sound

- Adjust headphones for comfort and clarity.

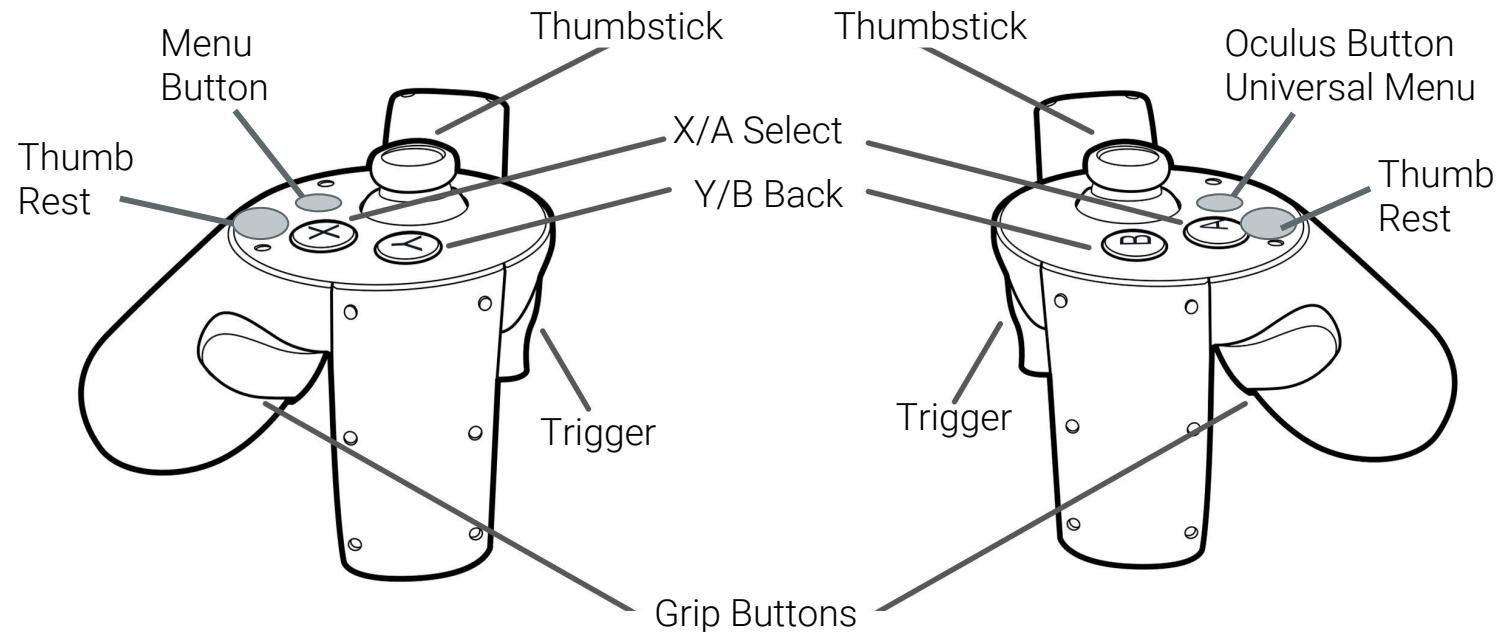


Oculus

# Controllers - Vive



## Controllers - Rift



# Cleanliness

- Wear a disposable sanitary mask for comfort and cleanliness

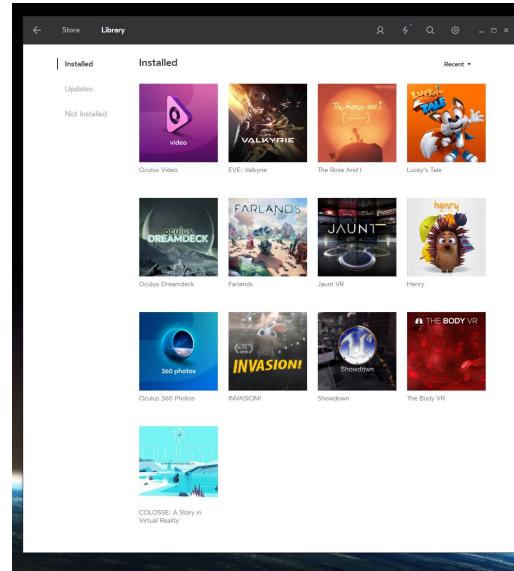


# Steam and Oculus Libraries

- Used to access VR games and tools
- The VR Studio has library accounts to use



Vive - Steam



Oculus - Oculus Store

# Using the VR Studio Computers

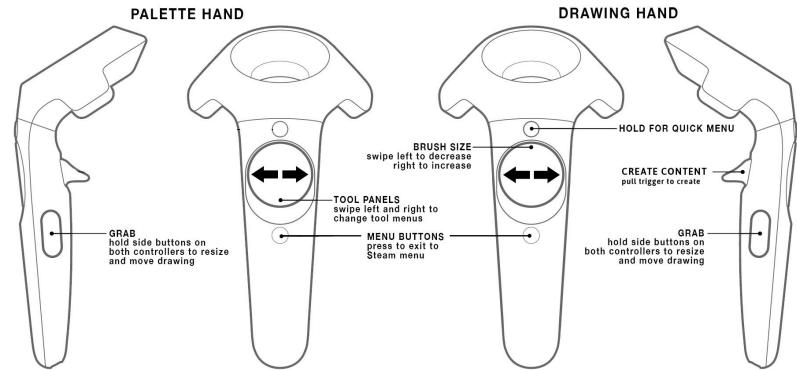
- Please make sure to logout of any personal accounts at the end of your session.
- The VR Studio computers should not be used to store projects or files. Please use your cloud drive space or portable drive.

# Hands On Experience

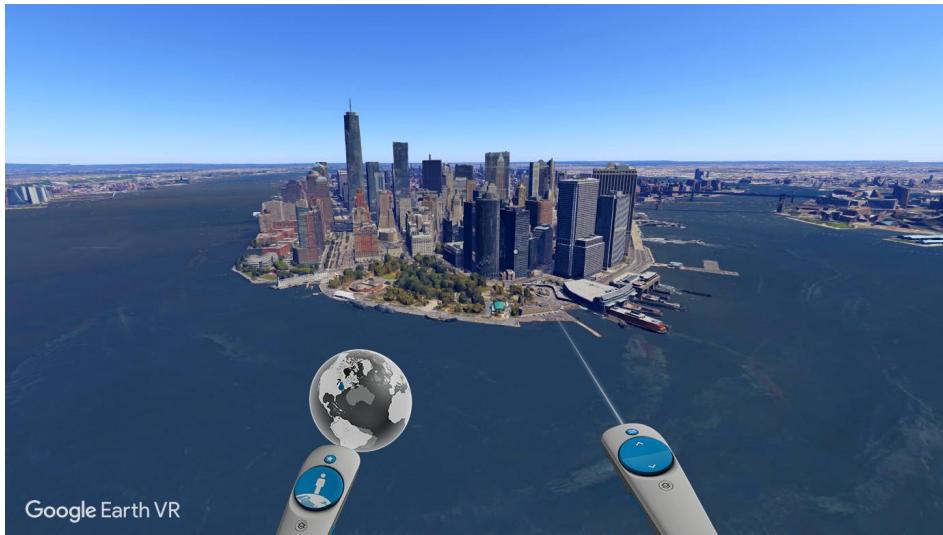
# Tilt Brush



Tilt Brush  
by Google



# Google Earth VR



Google Earth VR



# Thanks!

*Please fill out a waiver for our files so you can use the VR Studio.*

